

# READING COASTAL CLUES TO HYDROCARBONS SEEPS IN THE BIGHT

## At a glance

### Project title

Asphaltite and tar ball surveys

### Project summary

To understand the abundance, distribution, chemistry and source of coastal tar balls and asphaltites along the coast of South Australia.

### Project investigators

CSIRO

### Program partners

CSIRO, BP, SARDI, the University of Adelaide and Flinders University are working on a \$20 million research program to better understand the environmental, economic and social value of the Great Australian Bight.

### Project contacts

Dr Andy Ross  
CSIRO  
E: [Andrew.Ross@csiro.au](mailto:Andrew.Ross@csiro.au)

## Overview

The Great Australian Bight may contain valuable oil and gas resources. Existing evidence of hydrocarbons in the Bight include oil strandings – tar balls and harder, rock like asphaltites – on beaches, and fluid inclusions (bubbles of liquid and gas contained in sand grains) in subsurface rock of deep exploratory wells.

This project will survey the geochemistry of coastal strandings on South Australian beaches, and trace their probable origins using oceanographic and geological modelling.

It will also identify baseline hydrocarbon conditions on beaches and near shore environment, and establish drift patterns and a baseline of deep-sea habitats in the region.

## The Challenge

Previous geochemical studies have shown the vast majority of tar balls on South Australian beaches to have been transported from Indonesia by the South Equatorial and Leeuwin currents.

Asphaltites, on the other hand, are likely to have drifted beneath the surface, or along the seafloor, from local hydrocarbon seeps.

This project will survey the sites of most frequent present-day stranding of asphaltite and tar balls, and their geographic relationship to offshore surface and bottom currents.

A selection of asphaltites will be analysed for their elemental, isotopic and molecular fingerprints, and to determine their degree of

weathering and hence their likely proximity to the parent seep(s).

Tracing the path of asphaltites from the shoreline back to seafloor seeps requires a detailed knowledge of surface and deepwater currents that traverse the continental margin of South Australia, including zones of upwelling.

## The Research

This project comprises three main elements:

### Beach surveys

Hydrocarbon strandings will be surveyed on selected ocean beaches of Eyre Peninsula, Kangaroo Island and the Limestone Coast.



**Above:** Identification and sampling of an asphaltite specimen during a beach survey.

The surveys will be carried out by scientists, students and local community members, using CSIRO-developed statistical techniques similar to those that would be employed in the beach assessment in the event of an oil release affecting the shore.

#### *Analysis of coastal strandings*

From the suite of tar balls and asphaltites collected during the beach surveys, representative specimens will be selected for detailed physical and chemical analysis.

Elemental, isotopic and molecular typing will show the number of oil families present in the Bight and adjacent waters of south-eastern South Australia.

Their oil types will be compared with that of potential source rocks in the region, oil slick samples if recovered from deep-sea seeps, and fluid inclusions from existing exploratory wells.

#### *Provenance modelling*

Stranding location data will be used in conjunction with ocean, geological and weathering models to understand the possible sources of the asphaltites.



**Above:** Beach surveys will collect tar balls and asphaltites for further physical and chemical analysis from selected beaches of Eyre Peninsula, Kangaroo Island and the Limestone Coast.

Oceanographic models being developed for the Bight will enable the drift paths of tar balls and asphaltites to be tracked, including the effects of waves.

## The Impact

This research will help to identify possible hydrocarbon leakage points in the Great Australian Bight and provide a bank of specimens and geographic distribution data to further assist with derisking of petroleum exploration activities.

It will also support environmental management by assessing natural levels of hydrocarbons in shoreline habitats, and establishing a baseline record and drift patterns needed assess and respond to the impact of any potential hydrocarbon release into the environment.

## The People

**Dr Andrew Ross** of CSIRO is a marine scientist and petroleum geologist. His interests are in hydrocarbon exploration, hydrocarbon sensors, marine geology and oil spill science research.

**Dr David McKirdy** is an organic geochemist who teaches and conducts research on the use of geochemical techniques in petroleum exploration and basin analysis. He specialises in the analysis of coastal bitumens.

**Dr Se Gong of CSIRO** is an organic geochemist who develops new technologies for analysing the molecular and isotopic composition of gases from fluid inclusions. She also specializes in geochemical fingerprinting of oils in order to determine their source and processes that have led to their formation.



**Above:** Large asphaltite collected during a beach survey along the Great Australian Bight. This project will survey the geochemistry of coastal strandings on South Australian beaches, and trace their probably origins using oceanographic and geological modelling.

## For more information

Dr Steven Lapidge  
Great Australian Bight Research Director  
steven.lapidge@sa.gov.au

[www.misa.net.au/GAB](http://www.misa.net.au/GAB)

